Addressing The Care Gap After Stroke – Dr. Joseph F. Clark

Dr. Joseph F. Clark is a neurophysiologist who works with people to help get their brain and body as healthy as possible by addressing the care gap that exists for stroke survivors when they leave the hospital.

Tricerapro

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Bill 0:00
I'm not sure this abyss of nothingness, and we had no information whatsoever no one to turn to this was the hard part. So what I'd love to do is have a bit of a conversation with you about this gap that almost every stroke survivor that I've talked to tells me that they experienced in the very early days of going home and then sometimes for many months.

Intro 0:29
This is the recovery after stroke podcast. With Bill Gasiamis, helping you navigate recovery after stroke.

Bill 0:42
Hello, and welcome to episode 215 of the recovery after stroke podcast if you are a stroke survivor with a story to share about your experience with stroke, and

you've been thinking about reaching out to be a guest on the show, but we're waiting for the right time to reach out, this is it.

Introduction



Bill 0:57
If you go to recoveryafterstroke.com, you'll find a form that you can fill out to apply to be a guest on the show. As soon as I receive it. I will respond with more details on how you can choose a time that works for you and me to meet over zoom. Now my guest today is Joseph Clark, a doctor in the field of Neurophysiology who works with people to help get their brain and body as healthy as possible. Dr. Joseph Clark, welcome to the podcast.

Dr. Joseph F. Clark 1:24
Thanks, Bill. Nice to be here.

Bill 1:26
Lovely to have you here. I would love to know I always get excited and shocked and humbled by the fact that there's a whole bunch of people on the planet who decide to become doctors of all sorts, especially medical doctors. And the purpose is to help people they haven't met yet, that they don't know, through things that we're going, through the most difficult times, for example in our lives.

Bill 1:55
And we've got this whole bunch of people inside of a hospital and outside of a hospital, researching, etc. that have got our back or in my case, my brain. Can you give me a little bit of background about your journey to becoming a doctor and why you chose the field that you did?

Dr. Joseph F. Clark 2:16
Yeah, sure, of course. So a point of clarification. My doctorate is in neurophysiology. I'm not a medical doctor, but it's neurophysiology. I do have a medical license, I can, you know, see and take care of people. And in America, that's called a physician extender.

Dr. Joseph F. Clark 2:18
So I work with other physicians in a subspecialty that is most definitely neurophysiology, neurophysiatry, focusing on diagnosis, rehabilitation

management, treatment of traumatic brain injury and stroke. And in many places, those two are linked together.

Dr. Joseph F. Clark 2:55
They have differences, no question. But when there are deficiencies that are in my purview, there's a lot of overlap with regard to the patients that I see who have had a stroke or traumatic brain injury. And sometimes we have to be even more granular hemorrhagic stroke, ischemic stroke, you know, traumatic brain injury with skull fracture with hemorrhaging, there's, they can get pretty complicated.

Dr. Joseph F. Clark 3:28
And how I got to this, for me, the brain was always a puzzle. You know, one specific region of the brain can be very dedicated to a task like a motor task or a vision task. And if we talk about say, the frontal lobe with the frontal cortex, or the prefrontal lobe, that particular area of the brain can be damaged.

Dr. Joseph F. Clark 3:57
And sometimes it's damaged and a person has what's called a flat affect. They're just a lump, they don't want to do anything. And then sometimes they're hyperactive and disinhibited and they're wild and all over the place, almost the exact same injury can manifest in different ways, you know, with a stroke a person with a hemorrhagic stroke, it can sometimes seem fairly similar.

Dr. Joseph F. Clark 4:24
Like if you have a 60 cc stroke in one person well a 60 cc stroke, hemorrhagic stroke in another person could be drastically different and it could be because of metabolism could be because of location. It could be because of what we call a tight brain, a brain that fits tightly within your skull versus a person that does not have as tight a brain.

Bill 4:50
Let me interrupt you for a second. What's a 60 cc?

Dr. Joseph F. Clark 4:54
That would be 60 milliliters of blood. That's the volume of bleeding. And 60 is very serious. But 60 is also on that line where some people do very well and some people never recover.

What’s The Difference?



Bill 5:07
I always got curious after my brain hemorrhage is when I met other people who were way more injured than me post-stroke or had way more deficits, I always did kind of wonder, why them? Why did they have that injury to that extent, and I didn’t have an injury.

Bill 5:26
So the bleed amount is definitely one of those things, the location is definitely another one of those things. But you said something that’s really interesting is, depending on whether the brain fits in the skull, if the skull is a different size, or compared to the brain, that’s fascinating.

Dr. Joseph F. Clark 5:45
Right, so pre-existing hydrocephalus, or pre-existing brain atrophy, or just that’s not how you developed, can give the brain a little bit more room, should there be a hemorrhage and then increased intracranial pressure from a bleed is a bad thing as well.

Dr. Joseph F. Clark 6:05
And so there might be less intracranial pressure. So yes, all of those things come into play. And what we haven’t even talked about because there’s lots to talk about. Arterial versus venous, so arteries have a higher oxygen concentration. You probably heard of reactive oxygen species and oxygen free radicals. There’s more in oxygenated blood, arterial blood versus venous blood. So even that type of blood can come into play.

Bill 6:39
Wow so if the blood vessel is leading to the heart to be re-oxygenated, as opposed to coming from the heart, we can have a different outcome. And are those outcomes worse when the blood is oxygenated or worse when the blood is not oxygenated?

Dr. Joseph F. Clark 6:59
There is no absolute but it tends to be worse when oxygenated. So oxygen is a wonderful molecule, but it can be very toxic when it’s not controlled. And part of

my research in post-hemorrhagic stroke patients identified bilirubin oxidation products, which we call boxes, and bilirubin oxidation products are produced in much higher concentration from arterial hemorrhagic stroke versus venous hemorrhaging.

Dr. Joseph F. Clark 7:30
And it's because the oxygen oxidizes the bilirubin and bilirubin is a component of blood. And then the bilirubin oxidation products, which again are called boxes, the boxes are actually three different boxes, box A, B and C. And A and B are super toxic, C a little bit toxic. And that toxicity then produces a secondary biochemical damage in the brain from the hemorrhage itself.

Bill 7:59
Okay, so not only the brain cells go offline, because A. They're not receiving blood B. They're being interrupted by the actual blood being outside of the blood vessel, and then causing well poisoning or how would you describe it?

Dr. Joseph F. Clark 8:16
I would call it toxic metabolites. So it's a metabolite that is very toxic to brain and artery cells, and actually many cells. So yeah, poising maybe, but metabolic toxicity.

Bill 8:29
Okay. And then that metabolic toxicity, is that as severe a problem as as not having oxygen going to that part of the brain? Or are they similar?

Dr. Joseph F. Clark 8:44
Well, it's a tier. So tier one, the worst is no blood flow to the brain, and that's very bad. Tier Two is blood flow with a reasonable amount of oxygen that's best, blood flow with very little oxygen. That's bad, but not as bad as no blood flow. As blood flow with no oxygen still has good metabolites and takes away bad metabolites.

Dr. Joseph F. Clark 9:06
The worst is if you have low or no blood flow, plus toxic metabolites that aren't flushed, and that would be occurring if the boxes are building up. And that toxicity then makes more swelling, more swelling is more toxic, more swelling is more pressure, more pressure makes harder blood flow, and I know I'm talking to somebody who may have gone through a version of this. It can be a very bad series of events in the first one to three days after a hemorrhagic stroke.

Bill 9:39
So I had the first hemorrhage what they call a micro bleed or a small bleed into the brain, the arteriovenous malformation burst and it was leaking into the brain and that bleed was increasing in size over seven days by the time I went to hospital, and it was about the size of I think your dime, you know, something like that.

Bill 10:09
And then that was causing the symptoms which I was experiencing, which was the numbness on my left side. So that was settled down after they gave me some medication Dexamethasone that settled down and all my sensation came back. And then six weeks later, there was another bleed, which was more dramatic, and the onset was a lot quicker.

Bill 10:34
And that second bleed ended up being about the size, the amount of blood in the head was about the size of a golf ball. And that was sitting there for the best part of two and a half years near the cerebellum. So what it did was that amount of blood clot then took away my memory, my ability to finish a sentence, to remember who came to visit me, to type an email, to concentrate to focus.

Bill 11:10
I didn't recognize my wife at one point, I couldn't drive then, I couldn't be my usual self before all of this happened. And it's as a result of this big clot being in my head and then just sitting there for quite a long time. And then the doctors told me that as time lapsed, the clot got smaller, because it was being broken down or absorbed by the body or something like that.

Bill 11:39
And as it got smaller, more and more of those things came back, all those things that I'd lost, had come back and they took about a year and a half, two years ago, I was feeling my best that I had ever felt. And then I had the third bleed in November 2014, which was almost two and a half years after the first bleed.

Bill 11:58
And then I had brain surgery. So what you're describing that I experienced, was that toxicity occurring? Is toxicity more damaging than that. Does it actually take brain cells off line forever? Or does it interfere with them and then they come

back like they did with me? What happens there?

Dr. Joseph F. Clark 12:23
Well, the short answer is it depends. So the toxicity coming from the boxes, that is recoverable when the boxes are washed out, which is why I'm hesitant to say poison, it's more like toxic, you get rid of it. But when other things are going on, things start to add together.

Dr. Joseph F. Clark 12:49
So the boxes are more like a toxin that you can flush. However, if there are other things going on, like reactive oxygen, species, oxygen free radicals, now those things change cells and cell constituents at the molecular level, and it's called oxidation. And in chemistry, it's a covalent bond. So reactive oxygen species change the chemical structure of important chemicals, like basement membranes, like the membranes of the cell, like the vesicles, like the microtubules.

Dr. Joseph F. Clark 13:29
And then they don't function as they should. And that becomes its own kind of poison, because now the fundamental operation of the cells has been altered. And the only way to fix it is literally carve it out, get rid of it and replace it. That's not just good blood flow and let it flush. And both can occur. And the boxes are produced because of the reactive oxygen species. So both can be occurring at the same time. And then it becomes degrees.

What Is Physiology?

Bill 14:09
Okay, well, that's fascinating. So I've been down this journey now for the best part of 10 years. And it's really lovely to hear what you just said, for me, I'm the kind of guy I need to know exactly what's going on in my brain. And there was nobody that I could ask these questions who would answer in this specific way or in any way that made me understand what the blood in my head was doing other than causing me grief, I suppose. So now, let's talk a little bit about neurophysiology and what it is. I know it's made up of two words neuro and physiology. But what does that even mean?

Dr. Joseph F. Clark 14:46

Well, if you don't mind me saying I'm kind of old. And the degree neurophysiology is not as prevalent as it used to be, it's been replaced by neuroscience, so it's the science of neuro. Neurophysiology is the physiology of the brain and the nerves and physiology is how the cells and the tissues function, communicate and talk to each other. So it has a little bit of chemistry, there's physiology, a little bit of anatomy. And then there's the extrinsic function.

Dr. Joseph F. Clark 15:21
So what you see, so when I'm working if you don't want me segwaying in this way, as an example, if I'm working with a patient, and I see that their, let's say reaction times have slowed down. Now my brain in physiology said, well, slower reaction times could be because of action potentials. Action potentials are part of physiology. So I may need to see how their action potentials are impacted that might be slowing down the reaction test, action potentials are analyzed in some cases by an EEG.

Bill 15:40
Action potentials is the ability to do something is that part which instigates the action? Is that right?

Dr. Joseph F. Clark 16:09
Well no, the action potential propagates the message. Okay, so a cell a neuron or a glial cell, or even a sensory cell will initiate an action. So I put my finger I have a reaction, that's a reflex. What sends the signal from here to here, back again, are action potentials through axons and nerves. So action potentials are like wires and cables that are running the electricity to the different computers. So this is a computer, there's a little mini-processor here, and they all talk to each other.

Bill 16:48
Okay. So the action potential of a cell or a nerve is something that can be looked at, you can specifically work out whether that's functioning well or not functioning well.

Dr. Joseph F. Clark 17:01
Absolutely. Amplitude, speed and frequency. Yes.

Bill 17:05
Okay. And the EEG is the echo, what is it?

Dr. Joseph F. Clark 17:09
Electroencephalogram. Electro for electricity, encephalo, is for the brain, and gram just means measurement.

Bill 17:19
Yep. Okay, so we pop the amazing looking probes and all the different cables to the head. And then from there, we get feedback from the brain. And we're able to look at the chart and work out whether there is not enough energy or too much, or what are we looking for?

Dr. Joseph F. Clark 17:40
All of that, too much too little, hyperactive, hypoactive, all of that there are ranges that all of ourselves should be maintaining. And so too much or too little, are both not great. And the analogy that I learned what I was learning this too many years ago, is it's like walking on the precipice of a mountain, and you're walking along the path on the top of the mountain, and it's great, but too far to the right, you fall off and die too far to the left, you fall off and die, you want to stay right in the middle.

Bill 18:16
Okay. And then from there, you can potentially get some information about where that person may need support, what kind of interventions need to take place to support them?

Dr. Joseph F. Clark 18:32
Yes, absolutely.

Where Neurophysiologists Come In?

Bill 18:36
Now, where in the whole team that's supporting this person do you sit? Because, I imagine a whole bunch of other people that are around that person, that are looking at reports, that are meeting regularly to develop a path forward. Where does the neurophysiologist/neuroscientist sit in that whole team?

Dr. Joseph F. Clark 19:03
Right. So let me go through the steps and that will help. So in the acute phase, when the initial say hemorrhagic stroke hits, some people, it can be like a bolt of

lightning, and it hurts and things are really bad. That's done with emergency physicians, neurosurgeons, emergency physicians, a neurologist in the acute phase to keep the body and the brain alive.

Dr. Joseph F. Clark 19:34
Then there's the high acuity physicians, neuro-intensive care people, interventional neuroradiology, interventional neurosurgeons, that would be either doing the surgery or managing the person after the surgery, when the brain and body is in a very fragile state.

Dr. Joseph F. Clark 19:55
And then there's two steps after that there would be the in hospital where people are getting the person off of the acute monitoring so that the brain and body can, you know, sustain without lots of monitoring, these things are stable. And that would be like no hospital care. And then there's a rehabilitation facility. They're now at four steps right?

Dr. Joseph F. Clark 20:22
Now, rehabilitation facilities are where people like me come into play to get a person like you after injury, to higher functioning, and we start off simple, and that's activities of daily living, you can feed yourself, you can talk you can walk, and simple was an air quotes, because that's not necessarily simple, that can be very important.

Dr. Joseph F. Clark 20:47
And then after some time, and that's where decision occurs, there's the next phase of the getting you back to as close to your old you as possible. And that's where I deal with a lot of people. And I have dealt with people in the earlier phases, but I'm, you know, somewhat specialized. And so I'm in that fifth phase, where I work with a person or people to get you back to the old you, and I use that expression all the time.

Dr. Joseph F. Clark 21:18
Before the date of your injury before the date of your stroke. This is the old view, we want to get you back to the new you. And we talk about percentages, you're 50% of the old you you're 60% of the old you, we work people back to the old you.

Dr. Joseph F. Clark 21:34
That's where a lot of the neurophysiology people like myself come in the physician

extenders to do those last pieces of helping a person, get the brain and body as healthy as possible. And believe me, I'm saying brain and body for a reason. Because if the brain isn't talking to the body, there's something missing. So we will have people on exercise bikes, we're doing all sorts of brain and body and eyes and balance and memory, all integrated to get a person back to their old you.

Bill 22:10
So it sounds like you work in the facility that I was in similar. I may not have seen the person that did your role, for example, but then the people that I did see, were the occupational therapists and physical therapists. So it sounds like you work in conjunction or closely with that team. Is that right?

Dr. Joseph F. Clark 22:33
Absolutely, I work with OTs, PTs, and athletic trainers ATs are doing a lot of rehab for coordination and physical rehabilitation. So OTs, ATs, PTs, Speech Therapist, yes, I work with all of those.

Bill 22:52
Okay. I'm going to tell you a little story that you reminded me of. When you said we make sure that they can feed themselves, etc. One of my first things that I did in rehab, was in occupational therapy, when we were cooking for ourselves. But of course, I was in therapy for a month, learning how to walk again and use my left side again.

Bill 23:20
And I was dumbfounded why they would make me cook my own meals. Or why they would make me prepare my own breakfast. Nobody explained to me that it was part of the rehabilitation process, or at least I didn't clue in. And I found myself making my own breakfast and being completely frustrated because I couldn't do it properly.

Bill 23:41
And because I thought that they were supposed to help me get better not I was supposed to cook my own food and wash after myself. It was hilarious. Until I kind of complained about it. And then they said to me, well, this is part of your rehab, we're here to make sure that when you go home, you can use your arm and your leg appropriately enough to cook your yourself a meal.

Bill 24:08

So that was really interesting time. The way I took that was negatively but I understand now what it was for and that's excellent. The other thing that happened was there was a lot of conversation before rehabilitation started. So I was at the facility, I would say for about two days, where I wasn't doing any rehab.

Bill 24:30
I was just laying in bed waiting for rehab to start. And I kept being frustrated with the fact that why am I still in bed like I'm here for rehabilitation, I should be doing the things that I see other people doing, you know, on the particular devices, why aren't I in there?

Bill 24:47
And what I discovered after again complaining because I'd like to whinge about things every once in a while when I'm feeling helpless, I suppose. I was told that what I'm being evaluated to see what my abilities are, where my deficits are, where specifically the risks are and what help I'm going to need. And once the evaluation was complete, and everybody was in agreement, then they were going to set a course of action for me to go forward and do those next steps.

Bill 25:22
So that was really interesting, again, to learn that, although it seemed like I wasn't doing anything, the people in the background, were working it all out. And they were finding the right approach that was going to be useful for me and safe, I suppose, as well.

Dr. Joseph F. Clark 25:40
Yeah, safe has definitely that factored in. Sure.

Bill 25:43
Yeah. So then that was a very interesting time, it felt like I was in a part of my life, which was going to rehabilitate me to an extent and then set me home, you know, get me out of this whole, nearly almost two year, three year saga that had started with bleeds and all these deficits and all these issues, and all this scares and fears and brain surgery, and it felt like I was going to a threshold that was going to take me over to this place where none of the bad stuff was anymore.

The Care Gap After Stroke



Bill 26:25
And it was all going to be plain sailing from then on. But then I went home, Joseph, and when I went home, I had no idea what I was doing. Not only did I have no idea what I was doing, there was no support there. And my wife who before that she was a mom, she was a wife. She was somebody who went to work and did her thing. She was a daughter to her parents. And she was all those things. What she wasn't was a nurse. What she wasn't was trained in the field of neuroscience in any way, shape, or form.

Intro 27:00
If you've had a stroke, and you're in recovery, you'll know what a scary and confusing time it can be, you're likely to have a lot of questions going through your mind. Like how long will it take to recover? Will I actually recover? What things should I avoid in case I make matters worse.

Intro 27:17
Doctors will explain things that obviously, you've never had a stroke before, you probably don't know what questions to ask. If this is you, you may be missing out on doing things that could help speed up your recovery. If you're finding yourself in that situation, stop worrying, and head to recoveryafterstroke.com where you can download a guide that will help you.

Intro 27:40
It's called a seven questions to ask your doctor about your stroke. These seven questions are the ones Bill wished he'd asked when he was recovering from a stroke, they'll not only help you better understand your condition. And they'll help you take a more active role in your recovery. Head to the website now, recoveryafterstroke.com and download the guide. It's free.

Bill 28:03
And we were trying to navigate I'm not sure this abyss of nothingness. And we had no information whatsoever no one to turn to this was the hard part. So what I'd love to do is have a bit of a conversation with you about this gap that almost every stroke survivor that I've talked to tells me that they experienced in the very early days of going home and then sometimes for many months. How do you guys

deal with that knowing that you are going to send people home to this kind of space of no information and no support or lack of support?

Dr. Joseph F. Clark 28:48
Right? Well, I really have to say we do it very poorly. And it's disheartening for you it's it's heartening for me, for us, because if you notice when I was talking about getting people back to the old you I'm talking 60% 70% 85% I don't work with people to their 100%.

Dr. Joseph F. Clark 29:16
That's not the way I work the system works in America and Australia. I've also worked in France and England and I can tell you it's the same in all of them. There's this dead zone and that may not be a great term. But a lot of people post-stroke will get to a percentage at let's say 75% of the old you know using my terminology.

Dr. Joseph F. Clark 29:40
And then they go home. And you know mom isn't a nurse wife isn't a nurse husband isn't a nurse doesn't have experience in this. You're left to either try and resurrect some of the stuff that you did when you were in hospital with a therapist and do some of the that again. Or try yourself, I mean, trial and error.

Dr. Joseph F. Clark 30:08
And I'm going to tell you what I tell people and it's inadequate. And what I'm saying it, I know it's inadequate, but we all need to work better on getting the system, more facile for the patient. And I'm gonna say right now, and hopefully in just a second, support groups are helpful, because a lot of people have been through it before.

Dr. Joseph F. Clark 30:34
Sometimes the support groups are very helpful, sometimes they're less helpful. But there are several that I do refer people to, but let me paraphrase my expression when I have somebody that I'm discharging from care. And I'll say something like, you know, we've agreed that you're at 75%.

Dr. Joseph F. Clark 30:54
We are, discharging you from care, you're gonna go home, you can do things like the activities of daily living, there's more room for improvement. We've taught you a lot of methods that you can help keep up the progress. But the progress is

going to be slow for now. And you really need to keep working at it.

Dr. Joseph F. Clark 31:18
And people are getting depressed. So then I say, you may get to a point six months from now and think things are great, but then you might see me or somebody you haven't seen for a while. And they're like, Hey, you're a lot better than you were three months ago or four months ago, because hopefully, it's going to continue getting better.

Dr. Joseph F. Clark 31:36
And maybe you'll get to 100%, maybe not, but you're not done if you keep working. And there are some support groups. But unfortunately, the medical system is not going to be there for you unless something bad happens, please don't have anything bad happen. But we want you to keep getting better and keep moving forward.

Dr. Joseph F. Clark 32:03
And that is kind of the goal right now. And that's the main part of the conversation, there is another part of the conversation that I want to say. Because it's very important in this sort of discharge conversation. And that is if you get to something that we haven't trained you on, and you suddenly have forgotten it, okay, and I give examples, you get your okay to drive.

Dr. Joseph F. Clark 32:32
Alright, let's say you're okay to drive. And for the first time, since the injury, you're going to drive to Grandma's and you don't remember how to get to Grandma's that could occur, that part of your brain could have been damaged. Don't worry about it, don't stress, we will then that's it, for this to come back. And we're going to work some of the memory things or some of the older memories.

Dr. Joseph F. Clark 32:54
Right, because I can't know everything that could occur. I literally had somebody that we did a lot of rehab with. And we had them on a stationary bicycle a ton. The first time they got on a regular bicycle, they couldn't bicycle, you know, can't do everything. And this was a female and the female came back and said, I can't bicycle.

The Last Mile – Care Gap After Stroke

Dr. Joseph F. Clark 33:15
Okay, so we had to work balance and you know, some other things. Because we can't do everything. But if there's something relatively important, okay, then we'll work on that a little bit as well. And that's where things can continue to progress. But it really is an imperfect system for what we in the business called The Last Mile. If you think of it as a journey, that last mile, sadly, the patients are on their own.

Bill 33:47
Yeah. And sounds like that last mile is going to be the one that's more intensely resource heavy, like it's going to need a lot of resources to get to that end of that last mile. And I remember telling people, when they were asking me, how's your recovery coming along? I would say to them, I'm 95%.

Bill 34:09
And I was saying that for years, trying to work out how am I going to get to 96%. And my 95%, three or four years later, was way different compared to my 95% at the beginning, when I first started saying that, my original 95% wasn't in fact anywhere near 95%.

Bill 34:31
It's something that I imagined was, but then I couldn't judge because I had no way to judge. I only judged myself because I was upright. I was for example, able to walk to the kitchen, make something to eat and get back to the couch. And in hindsight, I wasn't anywhere near 95% but in my mind, I thought that I was. The other thing was I didn't get the opportunity to ring the facility and go, Hey, I'm struggling with this thing.

Bill 35:04
Remember, when you helped me out with all this stuff? I've hit a wall. What are your tips? Or can I attend again, or there seems to have been no, and not for the lack of wanting I would imagine, but no suggestion to touch base, if necessary with anyone from the rehabilitation facility, perhaps with your doctors, but again, your doctors are then taking the same role that they were before the bleeds.

Bill 35:37

Which was, you come in for a meeting, come for a checkup, get some bloods do this do that, you know, there was no additional support go and say for example, they didn't say to me go and see a neuropsychologist to determine your cognitive ability and to know what to train. So I know that America and Australia are similar in the way that people have explained to me the gaps in the support.

Bill 36:08
And I know there's a lot of people listening right now, who are going, Yeah, I am that person. What am I supposed to do? What can we tell people who are listening about what they can do to take a little bit of action to support themselves or to get more support.

Bill 36:24
At least in America, the feedback you give me might be more relevant in America, but it'll still be relevant here, or around the world where people are listening from, and it might jog them and their memory to do something that they didn't think that they should do or that they could do. What's something else that people could do now who are listening?

Dr. Joseph F. Clark 36:46
Well, with all due respect, you're one of the answers Bill, right? People need to listen to people like you who have been through it, find other helpful tips that are helping them because everyone is different. There is no one answer. Support groups where there's a group of people that have been through something similar, and what have they been able to do?

Dr. Joseph F. Clark 36:46
My biggest patient referral is literally patients from support groups where my patients have gone to the support group. And somebody says, Well, I'm having this problem, oh, well, doctor Clark can help you with that. So and I'm not advertising, I'm just giving an example.

Dr. Joseph F. Clark 37:25
Not practicing medicine, none of that stuff. But the network and the communicating because I can't give one answer. It could be speech therapy, it couldn't be memory, it could be psychology, could be nutrition. I had a person post-stroke, who had a balance problem, but he didn't have a balance problem. But it came across as a balance problem.

Dr. Joseph F. Clark 37:51
And I don't want to go into all the details. But talking, communicating networking, finding like-minded people, and then finding a clinician who's in the field, and it doesn't have to be a medical doctor. In America, there are physician extenders, nurse practitioners, athletic trainers, physical therapists, occupational therapists, speech therapists, psychologists, who usually work with physicians, and can make referrals or suggestions on the right person or people to see for specific things, addressing specific things.

Bill 38:36
Yeah, definitely don't do it on your own, is what I'm getting out of this is you need to get involved with groups, whether they are on social media or locally to you whatever you prefer. And then you need to be able to communicate with each person and get a feel for maybe they know somebody that can help you or maybe they've dealt with something similar to you, and they've got some advice or some tips.

Bill 38:59
It's definitely not something to try and work out alone, it's unlikely that you're going to work out this part of stroke recovery on your own, we don't have the tools, the resources, the energy, the capacity in the brain, all sorts of things are difficult after restrict the physical limitations, for example.

Bill 39:19
So I love that idea of kind of getting more involved in a community or as much involved in a community as you have the energy to do so. Because there's a lot of people that have been there through this before you you're not on your own, you might feel like it, but you're definitely not on your own.

Dr. Joseph F. Clark 39:38
Right, everybody is different. But there are a lot of similarities that can from historical precedent, other people been through it, and they may have ideas on how you might help with your next step.

Bill 39:55
Yeah, you briefly mentioned nutrition. I think nutrition is one of the keys to supporting the brain. And it's a journey that I think most stroke survivors should go on, they should learn about how better to support their brain after stroke so

that it serves them better. And their deficits are not as serious their brain fog is not as crazy.

Bill 40:18
Now we met because you and your colleagues contacted me a little while ago to tell me about a product that you're developing, hopefully to support people with their brain and to help the brain create better, more efficient energy and use that more effectively. Now, this is not an ad. And I wanted to talk about it because it's really important because it is one of those things to supplement like many other supplements that already exist out there.

Brain Energy Metabolism – Dr. Joseph F. Clark

Bill 40:55
Which is similar or different forms, that is designed to create a place where the brain can operate more efficiently. And now your product is called Tricerapro. I know it's in the very early stages of development and being made available to the public. But tell me a little bit about the journey that got you from all the stuff that you're doing to finding this other way to also help people get their brain working.

Dr. Joseph F. Clark 41:31
Sure, and thanks for the question, Bill. So the journey is fascinating. I will abbreviate it a little bit. So I was working with a neurosurgeon in England. And he and I and several of us, but we communicated a lot. We came to the conclusion that after stroke, and this is actually mostly hemorrhagic stroke patients, neurosurgeons take care a lot of those.

Dr. Joseph F. Clark 42:01
After hemorrhagic stroke, the patient's brains tended to be in an energy depleted situation. Now, energy metabolism is critical for almost all brain functions. And we were doing magnetic resonance spectroscopy and found that a lot of the brains were metabolically compromised.

Dr. Joseph F. Clark 42:24
And then we brainstormed on what are things that are good for brain energy metabolism. And believe me, we went through lots of them, you start this big and we came down to this. And the three we came down to was creatine, Beta-hydroxybutyrate, and magnesium. And they're all essential for brain energy

metabolism, and actually the whole body energy metabolism, but the brain to a unique situation. And we came to the conclusion for those three were very good for the brain.

Bill 42:58
Let's get back for a second. So what are those three? I reckon that most people that have gone to the gym have heard of creatine, I'm not sure how many have heard of beta-hydroxybutyrate. And what was the next one?

Dr. Joseph F. Clark 43:12
Magnesium.

Bill 43:13
And magnesium, and most people would have heard of magnesium, in the old days, I used to take magnesium, for muscle relaxation for things like that to support that type of thing. So tell me about what they are and how they support or how they help in the brain.

Dr. Joseph F. Clark 43:29
Right, so yeah, thanks. Sorry about that I got ahead of myself. So creatine is a natural compound, the human body can make it but the human body can only make about two grams a day. Creatine is essential inside the brain for energy metabolism because creatine gets converted to creatine phosphate. And creatine phosphate is a buffer that maintains the concentration of ATP high ATP is the energy currency without ATP.

Dr. Joseph F. Clark 43:57
We can't have action potentials we talked about earlier really cannot have any metabolic function because all metabolic function is paid for through ATP. Fossil creatine buffers ATP concentration, in other words, keeps it high. So it's like gas reserves. Creatine plus creatine phosphate is gasoline reserved for ATP with ATP being gasoline.

Bill 44:19
Okay, so let's so we can differentiate between the people who take it for the gym and the people who take it for their brain. What's the difference? Why do you know why might the people taking it for the gym? Take it and then what's the benefit? What's the difference for the people that are taking it for their brain now we in the brain was creating energy, but what are the gym junkies doing it for?

Dr. Joseph F. Clark 44:41
So creating, it has similar benefits for both and that is creatine has benefits to all tissues that have what's called a high and dynamic energy demand. So muscles, my biceps doing nothing. Then I curl 50 pounds my biceps has a high energy demand and went from low to high, so that's a high end dynamic energy demand that when my brain is talking, and literally, if I'm speaking, there are five main regions of the brain that have to talk to each other rapidly with high energy to be able to get, you know, mouth music.

Dr. Joseph F. Clark 45:23
Speech is something that is impaired in a lot of stroke patients. Now, sometimes it's from damage, but sometimes it's from energy mismatch. And, again, there's lots of reasons, but the creatine is helping the brain like the muscle, and that the brain regions have high and dynamic energy demands. And so therefore, it's maintaining the ability to meet those high and dynamic energy demands, instead of a constraction. It's a lot of firing of the action potentials.

Bill 45:56
Okay, so it's a similar type of contraction, that's not physically visible, that's happening in the brain, for lack of a better way to describe it. And as a result, that, that the larger levels of creatine or the greater quantities of creatine available, the more potential for the brain to take up that creatine and then use it so that it can create those action potentials.

Dr. Joseph F. Clark 46:21
And create and maintain those action potentials. Yes, absolutely.

Bill 46:24
Okay, awesome. So, what about magnesium? What does it do, again, in the brain, because I know what I used it fore, you hear people who suffer from cramps in the carbs or wherever somebody might say to them take some magnesium, it helps, what does it do in the brain?

Dr. Joseph F. Clark 46:43
So in the brain, it does a lot of things, the two main things that I'll talk about, or magnesium is an essential, and I mean, essential cofactor for ATP, which I just mentioned. So in other words, if you don't have enough magnesium, you might as well not have as much ATP.

Dr. Joseph F. Clark 47:01
So for every single ATP, one ATP molecule, each ATP molecule is literally holding a magnesium. And if it's not holding magnesium, it can't work. So ATP is an essential cofactor for the use of the function of ATP. Magnesium also is an a beneficial antagonist of calcium. Calcium is a very important molecule.

Dr. Joseph F. Clark 47:28
But after a brain injury after a stroke, calcium control is often lost, or the control is diminished. So calcium is now having detrimental effects. Because calcium can overload the brain. And it can say, with extra calcium in and around the brain cells, it can release more vesicles more neurotransmitters, so you lose control of your neurotransmitters.

Dr. Joseph F. Clark 47:54
These cells don't talk to each other. Well, magnesium will temper that won't stop it. But it'll temper that detrimental effect of the calcium toxicity. Because too much calcium is most definitely toxic. So magnesium definitely has two benefits for the brain under those circumstances.

Calcium Can Contribute To Stroke

Bill 48:14
I know you're not a nutritionist. So we're going to put a disclaimer here because I'm going to ask you a question about nutrition. Don't listen to us folks don't do what we say, this is just a conversation that always consult your medical team for information on your specific condition. So if calcium can be a problem, then would you say that my conclusion that you should avoid dairy and high calcium food in that time, would that be something worth considering and worth doing or not?

Dr. Joseph F. Clark 48:55
Not automatically, again, consult a dietitian or a nutritionist because I don't know what their blood levels aren't. Right? So if their blood levels are already normal, then the answer is yes. If the blood levels are low, maybe the low calcium actually contributed to the stroke that can absolutely occur.

Dr. Joseph F. Clark 49:20
A person can also be on calcium channel blockers for blood pressure. And obviously we know that misaligned blood pressure not a precise term, can can

cause or contribute to ischemic and hemorrhagic strokes. So I'm gonna have to answer not automatically, but certainly feel free to consult a physician and hopefully that physician is going to say, first thing I want to do is get a blood test.

Bill 49:45
Wow. I love that. I never would have expected that. That's what it comes out of it. So calcium can be responsible or partly responsible or contribute to stroke?

Dr. Joseph F. Clark 49:56
Absolutely, yes. So many blood pressure medications. Our calcium channel blockers that lower the amount of calcium that gets into the cells. And so if a person is on a calcium channel blocker for a while, and then they go off of it, their blood pressure can go up. And we absolutely know a drastic, unexpected rise in blood pressure can cause a hemorrhagic stroke. So the answer is yes. It's not a one step process. But yeah, I could connect those dots.

Bill 50:29
Fascinating. Wow. Okay. So what about beta-hydroxybutyrate? What is that? I've never heard of it before. Tell me what, what does it do?

Dr. Joseph F. Clark 50:42
So beta-hydroxybutyrate is a fascinating molecule. It is one of the ketone bodies. So people talk about a ketogenic diet. There are two physiological ketone bodies acetyl acetate and beta-hydroxybutyrate. They're the two physiological ketone bodies circulate in the bloodstream, on about a ratio not written in stone, but about a ratio of four to one for beta-hydroxybutyrate, one acetoacetate.

Dr. Joseph F. Clark 51:13
So beta-hydroxybutyrate is the more prevalent one. Beta-hydroxybutyrate is the brain's second favorite food. Favorite food number one is glucose. But glucose has problems with regard to diabetes, hemoglobin a one C, like oscillation, beta-hydroxybutyrate, doesn't have that problem.

Dr. Joseph F. Clark 51:35
And glucose, when it gets into the brain, it costs energy. And the energy metabolism of the brain has already compromised. So to use glucose, the brain has to actually expend energy, beta-hydroxybutyrate, when it gets into the brain, the first thing it does gives off energy, there is no energy investment to get the energy out the energy of beta-hydroxybutyrate, the structure of beta-

hydroxybutyrate is such that it doesn't need energy to give the energy out.

Dr. Joseph F. Clark 52:10
It liberates the energy pretty much right away. And then after that beta-hydroxybutyrate, then feeds into the mitochondrial system. The mitochondria is what makes a huge majority of the ATP in the brain. There are other ways to make ATP. But really the mitochondria is well and above all the others. And beta-hydroxybutyrate and acetyl. acetate, both feed into the mitochondria to help make a lot more ATP.

Bill 52:40
Okay, so a person can support their brain by supplementing with say, creatine, magnesium and beta-hydroxybutyrate. Now, that's what the product you're developing does. It's combining those three things to support the brain. If people have got better levels of those. What are they? Minerals? Chemicals? What are they?

Dr. Joseph F. Clark 53:13
Well, magnesium is a mineral, it's a metal. And then the other two are chemicals, creatine and beta-hydroxybutyrate.

Bill 53:20
If they've got more of those available, is that supporting brain function? And what is it doing? What might people notice that they're doing that's happening easier or better or recovering from what might they experience?

Dr. Joseph F. Clark 53:39
Well the goal in the way the product was designed is better energy metabolism and energy signaling and how that is manifest to the person to the physiology the functional physiology is different person to person. But the most common things are more fluent speech, because the speech requires a lot of energy, less brain fog, there's a lot of, in my vernacular, temporal disturbance with people.

Dr. Joseph F. Clark 53:48
Rhey feel slow, things are happening around them, sometimes too fast, sometimes too slow, or they're perceived slow, or they were walking and all of a sudden there was a car, and it seemed like it was going 100 miles an hour, but it wasn't, you know, those are temporal disturbances. And all of those metabolites help improve timing, because energy time and energy is the timing within the brain

requires the energy to be there all the time.

Dr. Joseph F. Clark 54:45
If the energy is mismatch, then the timing is loss and then there are these temporal disturbances. A little bit with memory as far as the short-term memory, not the long-term memory. So remembering shopping This, what you were just saying in a conversation, things that are involved in energy metabolism, temporal disturbances, brain fog, brain fatigue, that's where the Tricerapro can help.

Bill 55:17
So we've spoken about something that can support the brain after the stroke, after going home, there's this gap by suffered from chronic fatigue, so bad that getting up from the couch to go to the bathroom was a chore. And then it had been wiped out four hours later. And the fatigue changed and got less impactful over the years as it went on.

Bill 55:44
But I'm 10 years down and I still, from time to time get impacted with fatigue, what I've noticed is that some foods, when I eat certain foods, they interrupt my energy levels. And although I'm eating food, and suppose that that's supposed to help, that actually makes my brain not work so well.

Avoiding Certain Food

Bill 56:03
So do you know, of the types of things that might interfere with the uptake of magnesium or creatine or the production of natural occurring creatine, beta-hydroxybutyrate, and magnesium, what are some of the things we might consider avoiding or paying attention to if we consume it, and how that might make us feel so that we are not getting in our own way when it comes to energy and fatigue and the way that the brain is operating?

Dr. Joseph F. Clark 56:38
The first thing that comes to mind is high fructose corn syrup, the processed sugar that's in a lot of processed foods, you know, the Twinkies, the grocery store doughnuts, that type of thing.

Bill 56:54
Sodas.

Dr. Joseph F. Clark 56:56
Those things, yes. Those are very negatively impactful on the liver metabolism, which is important for the metabolites that go to the brain. The brain actually does not like fructose. But if the liver is occupying its time managing the metabolism of the fructose, the high-fructose corn syrup, it can't manage the other things for the brain. And that one just screams at me.

Bill 57:28
So that's interesting, because I've never heard sugar and the liver being spoken about together. I've heard about sugar and the fact that we need to create more insulin so that the insulin can deal with that. And then that's really energy taxing on the body. And then if you're not exercising, you're, you have way too much energy that's coming in, and you're not able to do anything with it expended in any way, because you've had a stroke, and you might not be as physical yet. Or you might not have the energy to do it. But how does the liver get involved in dealing with or metabolizing glucose? Because I assumed that it was just the insulin the pancreas doing all the hard lifting.

Dr. Joseph F. Clark 58:15
Right? Well, we were talking about diet. So and that preface is important, because the way I think about it is if we eat something goes into our stomachs and goes into our intestines, 70% of the stuff, the nutrients that go through the gut, goes through the liver first. So the liver is filtering, processing testing.

Dr. Joseph F. Clark 58:43
So it's got to manage all of the fats, the good fats, the bad fats, it's got to measure that, manage the glucose, the sucrose, the dextrose, the maltose, and the fructose high fructose corn syrup. And I mean, let's do the high fructose corn syrup, because I've been bashing on it. And I'm going to continue. So high fructose corn syrup when it gets into the liver, and you can consume grams of the stuff in one Cola.

Dr. Joseph F. Clark 59:10
And when it gets into the liver, the liver actually has to take two phosphates and two ATPs. And it's spending energy to phosphorylate it so chemically modifying it, and it can take up so much of the phosphate from the rest of the body that that phosphate could have been on magnesium or calcium. So now the fructose is impacting the magnesium and calcium concentration in the body.

Dr. Joseph F. Clark 59:35
Also, that fructose now needs more water so it's absorbing the water from the rest of the body. So now you have a hydration maybe a little bit of an imbalance but it's changing the metabolic environment. Now the liver needs to do something with it. Maybe it's going to convert it to fat. So now the fructose goes to fat so you're now making more unhealthy fats, or maybe the fructose is going through and do being produced to acetyl acetate, beta-hydroxybutyrate, that could be a good thing, but that's costly.

Dr. Joseph F. Clark 1:00:09
Now in small amounts that cost is very beneficial, because the liver now expense, the cost. And then that investment in cost energy costs the brain benefits from. But if you're taking something like the beta hydroxy, butyrate, or other supplements, the the liver can make other decisions on what to do with that high fructose corn syrup. Or, you know, after it's been processed, so the liver has a tremendous job when you take a drink that 12 ounces of Cola.

Bill 1:00:47
Okay, and I picked up the things that pricked my ears were ATP. So we spoke about ATP at the beginning of the conversation, and we spoke about it now at the beginning, we talked about how important it was for the brain. And how necessary it is to have an abundance of it to support the brain.

Bill 1:01:05
And what you're saying is when we consume something like a soda, the ATP, instead of being used at the brain is being used in the liver, to deal with the high fructose corn syrup and metabolize that, and therefore depleting our ATP levels, and therefore leaving less for the brain to use.

Dr. Joseph F. Clark 1:01:28
Not directly but yes. There's a couple of steps in there. But yes, it's a negative impact on the overall energy metabolism. The answer is yes, absolutely.

Bill 1:01:40
Okay. Well, that's the first time I've heard that, that's great, because that adds a couple of more bits of information in my knowledge, I know that we should avoid high fructose corn syrup. But the question is, I didn't really understand specifically why other than the general reasons, which is, it's not good for you.

And that was good enough for me.

Bill 1:02:04
And also, I noticed how I felt after I drink a soda after the brain injury. And I felt terrible, a little while later, like 20 30 minutes later. So that's very interesting. Well, you can see what kind of guy I am, I'm extremely curious, I want answers to questions, then answer to that. And we could go on like this forever, I really appreciate your time coming in and giving us a little bit of information on what to do after we go home, and we're lacking that one on one support.

Bill 1:02:38
And, we need to do something to support ourselves. And to start somewhere, I would encourage people to really get curious about nutrition and how that supports the brain, and to consider what they can add to their diet, but more importantly, what they can take out of their diet. Because I was, in my way, a lot at the beginning, I was getting in the way of my own recovery by just doing things that I didn't know, weren't supporting me, until I became curious about it.

Bill 1:03:09
I also didn't have somebody like you, Joe, that I could ring up and have a conversation with and say, Hey, should I be doing this? Or should I be doing that? Just from a general conversation perspective, I didn't have that. Nobody does. We don't have access to people like you, regularly unless you happen to be a family member. So I really appreciate the fact that you came on and you shared some of this information with the listeners. I think it's gonna help a lot.

Dr. Joseph F. Clark 1:03:37
Yeah, super happy to be here, Bill. Thanks for having me.

Bill 1:03:42
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Bill 1:04:05
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